

Front End Electronics

The requirements for readout electronics for pads and strips are very different. The input capacitance of the pad towers is 300-400 pF, the dynamic range of 14 bit is necessary to measure energy of the shower deposited substantially in a single tower as well as to detect a MIP particle traversing only two or three sensitive pads of the tower. The signals from the towers will be used to generate the trigger primitives. The input capacitance of the strips is 50-70 pF, the signal-to-noise ratio for MIP particles should be more than 10, dynamic range should be 8-10 bit.

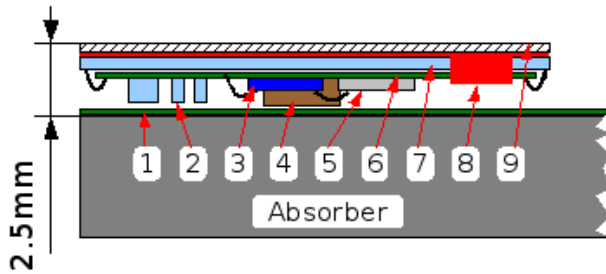


Fig. 1: Vertical cross-section of the readout module. 1) Carrier board 0.2mm, 2) RC network, 3) pitch adapter, 4) board-to-board connectors 0.9mm, 5) strip readout ASIC, 6) high-density interconnect, 7) sensor 0.3mm, 8) bias conductor 0.05mm, 9) protective ceramic cover 0.25mm.

The pads and strips are connected to the high density interconnect (HDI) through the wire bonds, the HDI is attached to a carrier board using low-profile board-to-board connectors. The carrier board is bonded to the absorber. The signals from individual pads are routed to the edge of the carrier board where they are passively summed with corresponding pads from other layers to form the tower signal. The tower signals are sent to preamplifiers via short flex jumpers and from the preamplifiers they are transferred differentially to the ADCs. The strips are digitized on the HDI and the digital buses from all strip ASICs are daisy-chained on the same carrier board. The layout of the carrier board is very challenging as it should exclude influence of the digital signals to the analog paths.